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Exploration on the Disciplinary Boundary Expansion and Innovation Direction of Environmental Art Design under the Background of Digital Transformation

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Abstract: Under the wave of global digital transformation, all disciplinary fields are facing opportunities and challenges of boundary reconstruction and development innovation. As a comprehensive discipline integrating art, technology and social needs, environmental art design has witnessed profound changes in its development pattern. The popularization and application of digital technologies have broken the disciplinary barriers of traditional environmental art design, driving it to extend from a single spatial design to a direction of diversified integration, with disciplinary boundaries continuously expanding and innovation paths becoming increasingly abundant. Based on the era background of digital transformation, this paper explores the core dimensions of the disciplinary boundary expansion of environmental art design, excavates the key directions of the disciplinary innovative development, and provides ideas and references for the high-quality development of the environmental art design discipline in the digital age, helping the discipline achieve connotative improvement and sustainable development.

Keywords: digital transformation; environmental art design; disciplinary boundary expansion; innovation direction

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1. Introduction

Under the background of digital transformation, digital technologies such as big data, artificial intelligence and virtual reality have gradually penetrated into the entire process of environmental art design, which not only changed the tools, methods and processes of design, but also reshaped the development philosophy and value orientation of the discipline[1]. Digital technologies have broken the barriers between environmental art design and related disciplines such as information technology, sociology, ecology and psychology, driving the discipline from closure to openness and from singularity to diversification, with its disciplinary boundaries showing the developmental characteristics of fuzziness and cross-border integration. At the same time, people's demands for environmental space have become more diversified, personalized and intelligent. They are no longer only satisfied with the traditional functional and aesthetic levels, but pay attention to its experienceability, comfort, sustainability and humanistic characteristics, which puts forward higher requirements for the innovative development of the environmental art design discipline. At present, the development of the environmental art design discipline is in a transitional period. How to adapt to the trend of digital transformation, break the shackles of

traditional disciplinary boundaries and find an innovative development path adapting to the times is a problem facing the discipline.

2. The Impact of Digital Transformation on the Environmental Art Design Discipline

First, it has realized the renewal of disciplinary development concepts. Digital transformation has driven the environmental art design discipline to shift from a "form-driven" model to an "experience-driven" and "green-driven" one. Traditional design focuses on the visual form and functional setting of space with a relatively single design concept, while digital design can more acutely perceive people's demands for space, fully consider the green ecology of the environment, reconstruct the core value orientation of design by combining people's sense of experience and happiness with the ecology and economy of the environment, and make design closer to people, society and nature [2].

Second, it has accelerated the digital process of design methods. Digitalization has changed the traditional design model dominated by manual methods and realized the digital and information-based development of design methods. Traditional design uses hand-drawing or model-making for expression, with low design efficiency and difficulty in modifying design schemes. In contrast, digital design allows designers to quickly carry out space construction, renderings drawing and design scheme modification on the computer, which not only improves design efficiency and accuracy, but also expands design imagination, realizes design concepts that are difficult to complete with traditional methods, and enriches design expression methods [3].

Third, it has reconstructed the pattern of cross-border integrated development of the discipline. Digital development has prompted the environmental art design discipline to break through the original disciplinary barriers and form a cross-border integration pattern. Traditional design has little cross-integration with other disciplines with clear boundaries, but digital technology is a general-purpose technology that connects environmental art design with multiple disciplines such as information technology, ecology and psychology, promotes the in-depth integration of knowledge, methods and concepts of various categories, and turns environmental art design from an independent existence of a single discipline into an important carrier of the cross-integration of multiple disciplines, with disciplinary boundaries gradually becoming fuzzy and open [4].

3. The Disciplinary Boundary Expansion of Environmental Art Design under the Background of Digital Transformation

3.1. Horizontal Boundary Expansion: The Normalization of Cross-Border Integration of Multiple Disciplines

The information age has promoted the cross-border integration and development of environmental art design with other related disciplines, breaking the limitations of the traditional single disciplinary system, and its horizontal scope has been continuously expanded. The "design +" model has shown a multidimensional development trend, which is the result of in-depth knowledge transfer, method transfer and thinking mode transfer between different fields, and the disciplinary category has been gradually expanded in this process [5]. The most important of which is the integration with information technology. The combination of the two complements each other: design works created in the information environment are more vivid and lively; designers can have a clearer and more accurate understanding of users' demands; and the design process has become more efficient and convenient [6]. This integration has derived fields such as digital design and intelligent design. Integration with ecology is an important embodiment: digital technologies help designers improve schemes and realize ecological concepts, driving design towards a green and ecological direction. Integration with psychology and sociology is an important supplement: based on digital technologies, people's psychological and social demands are perceived, making design more humanistic and transcending the scope of vision and function.

3.2. Vertical Boundary Expansion: The In-Depth Extension of Disciplinary Connotation

Under the background of digital transformation, the vertical boundary of the environmental art design discipline has been continuously extended, expanding from traditional spatial design to a broader field and realizing an in-depth transformation from “spatial design” to “environmental creation” and “lifestyle guidance”. The vertical boundary of traditional design is limited to the visual and functional design of indoor and outdoor space with a narrow scope; now it has extended to the entire process of environmental creation, covering all links such as planning, design, construction and operation, and relying on digital linkage to break information barriers and realize the whole-life cycle design. At the same time, the boundary has extended from physical space design to virtual space design, realizing an interconnected space of physics and virtuality, increasing experience, expanding functions and extending the developmental dimensions of the discipline. In addition, the boundary has extended to lifestyle guidance: by virtue of digital technical means, designers create conceptual spaces with humanistic and ecological concepts, guide people to establish a healthy and sustainable lifestyle, and enrich the core significance and connotation of the discipline.

4. The Innovation Direction of Environmental Art Design under the Background of Digital Transformation

4.1. Innovation of Design Concept: Establishing a Diversified and Integrated Design Concept

Design concept is the soul of environmental art design. Under the background of digital transformation, the innovation of design concept is the core of the disciplinary innovative development. It is necessary to break the shackles of traditional design concepts, establish a diversified and integrated design concept, and adapt to the development needs of the times.

First, adhere to the people-oriented design concept and put people at the core of design. Digital technologies can help designers better grasp people’s physical, psychological, social and spiritual demands, analyze and express them by digital methods, and create a spatial environment more suitable for people. In the design process, the different demands of various groups of people should be considered, focusing on the inclusiveness, comfort and experience of space, and putting people first to make design better serve people and realize the harmonious development between people and space in the space [7].

Second, establish an eco-sustainable design concept and integrate ecological concepts into the entire design process. Sustainable development has become a common pursuit of the world, and environmental art design should shoulder the mission of ecological protection and sustainable development. Designers can improve design by using digital technologies, reduce the use of natural resources and damage to nature, adopt green and recyclable materials, build a green ecological circle, promote the greening and ecologicalization of design, and form a harmonious coexistence between man and nature [8].

Third, establish a cross-border integrated design concept and break traditional disciplinary boundaries. Environmental art design itself is a comprehensive discipline. Under the digital background, it is necessary to take the initiative to integrate the concepts and methods of multiple disciplines such as information technology, ecology, psychology, sociology and aesthetics, enrich the connotation and dimensions of design, break traditional limitations, and create a spatial environment with both artistry, practicality, ecology and humanistic characteristics. In this way, the comprehensive renewal of design thinking can be achieved.

4.2. Innovation of Design Methods: Promoting Digital and Intelligent Upgrading

The innovation of design methods is an important support for the disciplinary innovative development. Under the background of digital transformation, the innovation of design methods mainly focuses on digitalization and intellectualization, breaking the limitations of traditional manual design, improving design efficiency and quality, and enriching design expression and presentation effects.

First, strengthen the digitalization of design methods and adopt digital design software and technologies as much as possible to replace traditional methods such as hand-drawing and model-making in the design process [9]. Digital design methods can quickly carry out space modeling, renderings drawing and design scheme modification, which not

only improve the work efficiency and accuracy of design, but also accurately express designers' design concepts and the presented design effects. In addition, through visual effects, people can have a preliminary understanding of the space and put forward modification suggestions, improving the rationality and feasibility of design.

Second, intellectualize the design process and use artificial intelligence, big data and other technologies to intelligently generate, optimize and adjust design schemes [10]. Big data technology can accurately analyze people's habits and demands for space use and social development trends, and carry out design on this basis to avoid blind design; artificial intelligence can automatically generate multiple schemes and conduct intelligent optimization according to design demands and parameters, which not only improves the diversity and rationality of schemes but also reduces the workload of designers, enabling them to devote more energy to the expression of conceptual creativity and humanistic implication.

Third, encourage the diversified development of design techniques and develop new design methods such as parametric and modular design by using digital technologies. Parametric design can modify and improve design schemes by changing parameters, with high flexibility and adaptability; the emergence of modular design can make design elements more unified and standardized, form certain modules, increase the universal applicability of design on the premise of ensuring high efficiency, facilitate subsequent maintenance and replacement, and strengthen the standardization and regularization of environmental art design [11].

4.3. Innovation of Design Content: Realizing Diversified and Integrated Development

The innovation of design content is an important embodiment of disciplinary innovation. With the expansion of disciplinary boundaries and the upgrading of people's demands, the content of environmental art design needs to be continuously innovated to realize diversified integration, break traditional limitations and enrich the connotation and form of design [12].

First, realize the integrated innovation of physical space and virtual space design. In the digital age, virtual space has become an indispensable part of people's life, and the combination of physical space and virtual space has become a trend. Environmental art design should not be limited to the attention to physical space, but should also take virtual space as its research object. With the help of digital technologies, build a virtual space matching the physical space, connect the two, increase space experience, extend space use, and make space design more adapt to the needs of digital lifestyle [13].

Second, realize the innovation of ecological design content and strengthen the in-depth application of ecological design concepts and design content. In the design process, attention should not only be paid to the beauty and rationality of space, but also to ecological protection, ensuring good lighting and ventilation effects of space, reducing the consumption of resources and energy and the damage to the natural environment. Add elements such as plants and water surfaces in the design process, strengthen the protection of original vegetation, form a green landscape space with ecological, livable and regional characteristics, and reflect the characteristics of ecological design.

Third, realize the innovation of humanistic design content and pay attention to the design and expression of humanistic connotation. Environmental art design itself is a carrier of humanistic connotation. In the design process, it should combine regional culture, historical traditions and social customs, and inject humanistic factors into it. The use of digital technologies can better explore and display regional culture and historical traditions, making design more regional and cultural, focusing on the perfect integration of humanistic and artistic characteristics, and avoiding stereotyped designs and design works without humanistic colors.

4.4. Innovation of Design Talents: Cultivating Compound Professional Talents

Talent training is the key to disciplinary construction. In the digital age, with the extension of disciplinary fields and innovative development, the requirements for talents have become more comprehensive. There is a need for professional talents with a combination of artistic accomplishment, technical knowledge, humanistic quality and innovative ability [14].

First, consolidate the foundation of talents' artistic accomplishment, strengthen the education of aesthetics, design history, art theory and other aspects, improve talents' aesthetic ability, creative ability and expression ability, enable talents

to create a spatial environment with both artistic characteristics, adhere to the artistic soul of design, and avoid the lack of artistic connotation of design under the dominance of technology.

Second, strengthen talents' digital technical ability, strengthen the education and training of digital design tools, big data, artificial intelligence, virtual reality and other technologies, enable talents to master digital technologies proficiently, realize the in-depth integration of technology and design, improve design efficiency and quality by virtue of technical advantages, and adapt to the new requirements of design work in the digital age.

Third, cultivate talents' innovative thinking and cross-border thinking, break the limitations of traditional education models, encourage talents to actively explore new design concepts, design ideas and design content, and dare to break through traditional design forms. At the same time, pay attention to the cultivation of talents' practical ability, promote the organic combination of theoretical knowledge and design practice, enhance the comprehensive application ability and innovative ability of talent training, so as to provide an endless source of vitality for the innovative development of the discipline [15].

5. Conclusion

The arrival of the digital age has brought new opportunities and challenges to the development of the environmental art design discipline. The discipline has shown the expansibility of horizontal cross-border integration and vertical connotation extension, providing a huge space for disciplinary innovation and development. The application of digital technologies is not only changing the concepts, methods and content of environmental art design, but also reshaping the disciplinary development pattern and value orientation, promoting the environmental art design discipline to move from traditional spatial design to a development direction of multi-dimensional integration, intelligent high efficiency and ecological humanism. It is necessary to recognize that the boundary expansion and innovative development of the environmental art design discipline is a long-term process. It is required to adapt to the era trend of digital transformation, adhere to the core connotation and mission of the discipline, constantly break through the shackles of the traditional development framework, promote the in-depth integration of multiple disciplines, pay attention to the expression of humanistic and ecological characteristics, and realize the connotative improvement and sustainable development of the discipline.

Disclosure statement

The author declares no conflict of interest.

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